



: 9/764,523
: January 18, 2001

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SEP 10 2003

TC 1700

REMARKS

Rejections Under 35 U.S.C. §102

Claims 33-35, 37-40 and 45 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,788,778 (Shang et al.).

Applicants respectfully traverse the rejections and submit that Shang et al. does not teach each and every feature of independent Claim 33. Specifically, Shang et al. does not disclose the etch rate of greater than or equal to about 2.0 microns/minute in combination with the other claim limitations.

The Office Action states that "inherently the rate of removal will also be the same, even if the same is not identically disclosed." Applicants submit that this finding is not only unsupported by Shang et al. but is actually directly contradicted by Shang et al. As noted by the Examiner, Shang et al. does teach a microwave source that is capable of delivering power in the range of 3,000-12,000 Watts (column 5, lines 11-13), and Applicants do not dispute that this teaching meets Applicants' limitation of "applying energy with a power of less than about 3,000 W." This does not, however, mean that applying 3,000 W to the apparatus of Shang et al. would meet the limitation of "removing ... at a rate of greater than or equal to about 2.0 microns/minute."

On the contrary, Shang et al. specifically teaches an etch rate of 1 micron/minute when the microwave source operates at 5,000 Watts:

The cleaning rate for as-deposited film has reached 1 micron/minute for silicon nitride (flowing 2,000 sccm of NF₃ at a remote chamber pressure of 15 Torr, a remote chamber power of 5,000 Watts and a susceptor temperature of 360°C.) and 1 micron/minute for, e.g., silicon nitride. These cleaning rates are faster, e.g., twice as fast, than the conventional cleaning process which employs only a local plasma with a power level of about 3 kilowatts at 15.56 MHz RF.)

Column 6, lines 14-23. Furthermore, not only does Shang et al. teach a specific etch rate that is *half* of Applicants' recited minimal etch rate at a power that is higher than Applicants were cited power, Shang et al. also clearly implies that lower power will lead to lower etch rates. The last

sentence of the foregoing quoted section implies an etch rate of 0.5 micron/minute at 3,000 W (for a conventional tool). Furthermore, even his own tool in general would be expected to demonstrate a lower etch rate below 5,000 W, as is clear from the following statement. "Therefore, the combination of a high power and high pressure plasma in the remote plasma activation chamber leads to an unexpectedly efficient, localized and stable plasma." Column 6, lines 8-11. See also column 5, line 31 to column 6, line 11, describing how high power and high pressure lead to more efficient etching.

Thus, contrary to the Examiner's statement, Shang et al. does *not* inherently teach an etch rate of 2 microns/minute or greater at a power of 3,000 W or less. Rather, Shang et al. teaches a skilled artisan that at powers below 5,000 W the etch rate will be less than 1 micron/minute.

Furthermore, to avoid acquiescence, Applicants point out that many of the Examiner's additional assumptions regarding the anticipation rejections are incorrect. For example, as to Claim 38, the Examiner states that opening a valve on the piping after conducting a CVD reaction and prior to supplying any activated species is disclosed by Shang et al. at "column 5, line 15 at et seq. especially at line 23 at et seq." In actual fact, Claim 38 specifies a valve on "the piping" which is recited in Claim 33 as the piping "from the remote plasma discharge chamber to the reaction chamber." Shang et al. describes only a "flow restrictor 59" in such piping. Although Shang et al. does state that any device, such as a reduction valve or a needle valve, could be employed for such flow restriction, Shang et al. does *not* describe any opening or closing such flow restriction during operation. Rather, Shang et al. specifically discloses control over the flow rates using upstream valve and controllers 50, 53, and not flow restrictor 59. These upstream valve and controllers do not reside in "the piping" between the remote plasma chamber and the reaction chamber, but are rather upstream of the remote plasma chamber.

Furthermore, with respect to Claim 39 the Examiner states that Shang et al. discloses a needle valve to meet the limitation of "withdrawing a sealing element completely from a path to form an opening substantially as wide as internal surfaces of the piping." Applicants respectfully submit that a needle valve does not meet the limitation of Claim 39.

In view of the foregoing remarks, Applicants respectfully submit that the rejected claims are not anticipated by Shang et al. Furthermore, the art contains no teaching suggestion to modify the teachings of Shang et al. to arrive at the claimed invention.

Rejections Under 35 U.S.C. §103

The Examiner has rejected Claim 36 as being unpatentable under 35 U.S.C. §103(a) over Shang et al. and U.S. Patent No. 5,844,195 (Fairbairn et al.).

Applicants respectfully traverse rejections. In the first place, as noted above, Shang et al. does not teach each and every feature of independent Claim 33, and Fairbairn does not supply the deficiencies. Moreover, the skilled artisan would not have been taught by Shang et al. or Fairbairn how to address the deficiencies of Shang et al., since Shang et al. specifically teaches that higher powers would be required to arrive at higher etch rates.

Additionally, even if Shang et al. had met all of the limitations of Claim 33 (which they do not, as noted above), there still would be no teaching or suggestion that adjusting the frequency teachings of Shang et al. with the frequency teachings of Fairbairn would arrive at the recited etch rates using the recited power. Note that the embodiments of Shang et al. employ a 2.54 GHz microwave power source (column 4, line 62).

Accordingly, Applicants respectfully submit that the pending claims are patentable over the references of record.

CONCLUSIONS

In view of the foregoing remarks, Applicants submit that the claims are in condition for allowance and respectfully request the same. If, however, some issue remains that the Examiner feels can be addressed by Examiner Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Respectfully submitted,

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Dated: September 3, 2003

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